The

N O - S L O T   C L O C K

USERS MANUAL

SMT

P E R I P H E R A L S   L T D.

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12:00-2:00PM PACIFIC STANDARD TIME

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This warranty does not cover damage caused by accident, misuse, misapplication, or unauthorized service or modification. SMT Peripherals LTD. is not liable for any damages to the customer's computer due to any cause.

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SECTION 1.   INTRODUCTION

The SMT No-Slot Clock is a real-time clock/calendar designed to be installed in virtually any computer with a 28 pin ROM socket. It is the only clock/calendar available that works with any micro-processor and does not require the use of a slot. The No-Slot Clock is quickly installed on the system motherboard or daughterboard in any available 28 pin ROM socket. If no empty socket is available then remove the ROM, insert the No-Slot Clock, and "piggy-back" the ROM onto the No-Slot Clock socket.

The No-Slot Clock provides time keeping information including hundredths of seconds, seconds, minutes, hours, days, date, month, and year. The date at the end of each month is automatically adjusted for months with less than 31 days, including correction for leap years. The SMT No-Slot Clock contains two lithium batteries and will maintain time in excess of ten years in the absence of power.
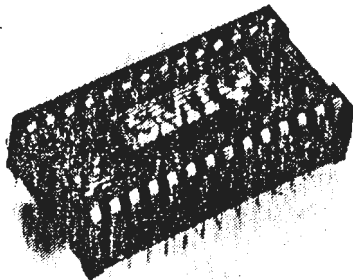
SECTION 2 - INSTALLATION

SMT recommends that you contact your dealer for assistance in installing your No-Slot Clock.

2.1   IBM compatible computers

This section of the manual describes how to install the No-Slot Clock in an IBM or MS DOS compatible computer. If you are using an APPLE compatible computer then skip to section 2.2 for installation instructions.

2.1.1   Overview

The No-Slot Clock may be installed in virtually any IBM or MS DOS compatible computer. This includes PC, XT, and AT machines using 8088, 8086, 80186, 80286, V20, and V30 processors. At the time of this manual the 80386 processor has not been tested however there is good reason to believe the No-Slot Clock will perform correctly. Installation consists of finding a ROM socket on the motherboard or a daughterboard which is addressed in the memory map range from C0000 through CFFFF, inserting the No-Slot Clock device in the socket, then piggy-backing the original ROM on the No-Slot Clock if the socket was not empty. The following sections tell you how to find the correct ROM to use.

Tools:
            - Medium size phillips screwdriver
            - Medium size flat screwdriver
            - Small flat screwdriver or IC puller

2.1.2 IBM PC MOTHERBOARD

The IBM PC motherboard does not have a 28 pin ROM socket. Please see section 2.1.6 for instructions on installing the No-Slot Clock in a daughter board. There is a way to modify the No-Slot Clock chip for direct use on the IBM PC motherboard, however it requires some soldering skill and is not recommended. If you must use the motherboard call your dealer or the SMT service line for instructions. This modification will void the No-Slot Clock warranty.

2.1.3 XT STYLE MOTHERBOARD

The IBM XT and XT compatible motherboards have an 8088 or V20 micro-processor. If your computer has an 8086, 80186, or V30 micro-processor see section 2.1.5. If your computer has an 80286 micro-processor see section 2.1.4. The No-Slot Clock chip is normally installed on the motherboard of XT compatible machines but may be installed on certain daughterboards if necessary. (for example: Televideo computers require the No-Slot Clock to be installed on the hard disk controller because there is not enough clearance on the motherboard for the No-Slot Clock chip.)

1)   Turn your computer off. Do not unplug the computer from the wall, since the 3 prong plug helps ground the system.

2)   Remove the cover from your computer. See your users manual for instructions on removing your cover.

3) Touch the metal power supply cover to discharge any static build up on you or your clothes.

4) Look at the motherboard of your computer. On most XT style computers you will find a row of two to seven ROM sockets located near the middle of the motherboard. Locate an empty socket. If you found an empty socket skip to step 6.

XT Style
Motherboard
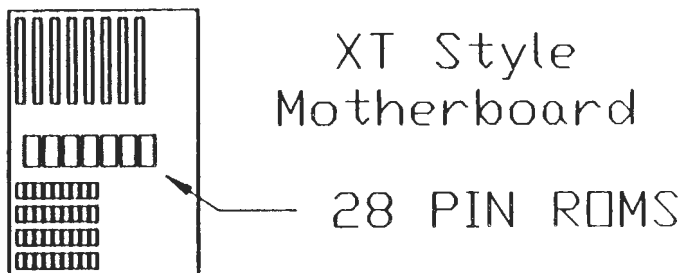
28 PIN ROMS

Figure 1

5) If there is no empty 28 pin ROM socket you will need to remove a ROM from a full socket. Before removing the ROM make note of the pin 1 direction. If you don't know how to tell where pin 1 is, call the dealer where you bought the No-Slot Clock, or the SMT service line, for assistance. Use an IC puller or a small flat-bladed screwdriver and carefully pry the ROM from the socket. BE VERY CAREFUL NOT TO DAMAGE THE ROM AS YOU PRY IT FROM ITS SOCKET.

6) Look at the No-Slot Clock. At one end of the No-Slot Clock you will notice an indentation. This is the pin 1 end of the No-Slot Clock. At the other end of the No-Slot Clock you will notice a big "E". This is the pin 14 end of the No-Slot Clock. DO NOT MIX UP PIN 1 WITH PIN 14. See figure 2.

NOTCH ——→ SMT E ←—— PIN 14
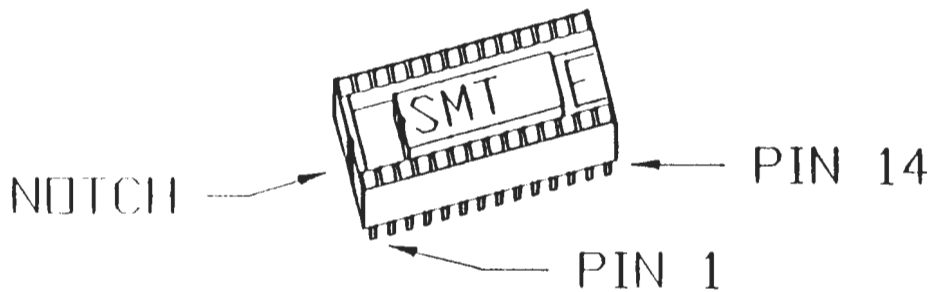
PIN 1

Figure 2

7) Carefully install the No-Slot Clock in the empty ROM socket on the motherboard of your computer. You must be certain pin 1 of the No-Slot Clock aligns with pin 1 of the ROM socket it is plugged into. Plugging the No-Slot Clock in backwards may damage the No-Slot Clock and/or your motherboard.

8) If you removed a ROM from your motherboard in step 5 plug it into the No-Slot Clock. Be careful not to bend any pins and that pin 1 of the ROM aligns with pin 1 of the No-Slot Clock.

9) Reinstall the cover to your computer.

10)   Your installation is now complete. Refer
        to section 3 for instructions on using the
        No-Slot Clock utility software.

2.1.4   AT STYLE MOTHERBOARD

The IBM AT and compatible motherboards
have an 80286 micro-processor. The No-
Slot Clock chip is normally installed on
the motherboard of AT compatible
machines but may be installed on certain
daughterboards if necessary for space
reasons (some compatible computers locate
the ROMs under the lip of the power
supply).

1)   Turn your computer off. Do not unplug
        the computer from the wall, since the 3
        prong plug helps ground the system.

2)   Remove the cover from your computer.
        See your users manual for instructions on
        removing your cover if you don't know
        how.

3)   Touch the metal power supply cover to
        discharge any static build up on you or
        your clothes.

4)   Look at the motherboard of your com-
        puter. On most AT style computers you
        will find a row of two to four ROM
        sockets located near the middle of the
        motherboard. If these ROMs are located
        in an inconvenient place refer to section
        2.1.6 to see if you can install the No-Slot
        Clock on a daughter board. The ROMs

normally have a sticker on them with an "H" on one and an "L" on the other. This refers to the High byte ROM and the Low byte ROM. Locate the Low byte ROM. If you can't tell the difference call your dealer, or the SMT service line for assistance. If your dealer can't help you, try both ROMs. There is no danger of damage to the ROMs plugged into the No-Slot Clock unless you plug something in backwards or bend a pin.

AT style motherboard

28 Pin ROMs
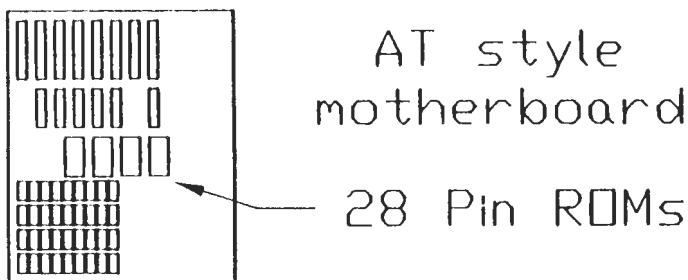
Figure 3

5)   You will need to remove the Low byte ROM from its socket. Before removing the ROM make note of the pin 1 direction. If you don't know how to tell where pin 1 is, call the dealer where you bought the No-Slot Clock for assistance. Use an IC puller or a small flat-bladed screwdriver and carefully pry the ROM from the socket. BE VERY CAREFUL NOT TO DAMAGE THE ROM AS YOU PRY IT FROM ITS SOCKET.

6)   Look at the No-Slot Clock. At one end of the No-Slot Clock you will notice an in-

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dentation. This is the pin 1 end of the No-Slot Clock. At the other end of the No-Slot Clock you will notice a big "E". This is the pin 14 end of the No-Slot Clock. DO NOT MIX UP PIN 1 WITH PIN 14. See figure 2 in previous section for a drawing of the pin 1, position of the No-Slot Clock.

7)   Carefully install the No-Slot Clock in the empty ROM socket on the motherboard of your computer. You must be certain pin 1 of the No-Slot Clock aligns with pin 1 of the ROM socket it is plugged into. Plugging the No-Slot Clock in backwards may damage the No-Slot Clock and/or your motherboard.

8)   Plug the ROM you removed from your motherboard in step 5 into the No-Slot Clock. Be careful not to bend any pins and that pin 1 of the ROM aligns with pin 1 of the No-Slot Clock.

9)   Reinstall the cover to your computer.

10)   Your installation is now complete. Refer to section 3 for instructions on using the No-Slot Clock utility software.

2.1.5   8086 and 80186 based motherboards

The 8086 microprocessor is a 16 bit computer chip with a 16 bit data bus. It is used in some "XT" compatible machines because it is faster than the 8088 microprocessor. The 80186

microprocessor is an enhanced version of the 8086 and generally uses less space to build a computer system. It is in use in several "Lap Top" computers. In most implementations the ROM space is built just like the "AT" style computers with a Low byte and a High Byte ROM. The clock chip is normally installed on the motherboard of 8086 and 80186 based machines but may be installed on certain daughterboards if necessary for space reasons (some compatible computers locate the ROMs under the floppy disk drives).

1) Turn your computer off. Do not unplug the computer from the wall, since the 3 prong plug helps ground the system.

2) Remove the cover from your computer. See your users manual for instructions on removing your cover if you don't know how.

3) Touch the metal power supply cover to discharge any static build up on you or your clothes.

4) Look at the motherboard of your computer. On most 8086 based computers you will find a row of two to four ROM sockets located near the middle of the motherboard. Check to see that there is an even number of ROM sockets. (If there is an odd number of ROM sockets the computer is probably designed like an 8088 based machine and you should use the instructions in section 2.1.3 above.) If these ROMs are located in an inconvenient

place, refer to section 2.1.6 to see if you can install the No-Slot Clock on a daughter board. The ROMs normally have a sticker on them with a "H" on one and a "L" on the other. This refers to the High byte ROM and the Low byte ROM. Locate any Low byte ROM. If you can't tell the difference call your dealer for assistance. If your dealer can't help you, try all the ROM's. There is no danger of damage to the ROMs plugged into the No-Slot Clock unless you plug something in backwards or bend a pin.

5)   You will need to remove the Low byte ROM from its socket. Before removing the ROM make note of the pin 1 direction. If you don't know how to tell where pin 1 is, call the dealer where you bought the No-Slot Clock for assistance. Use an IC puller or a small flat-bladed screwdriver and carefully pry the ROM from the socket. BE VERY CAREFUL NOT TO DAMAGE THE ROM AS YOU PRY IT FROM ITS SOCKET.

6)   Look at the No-Slot Clock. At one end of the No-Slot Clock you will notice an indentation. This is the pin 1 end of the No-Slot Clock. At the other end of the No-Slot Clock you will notice a big "E". This is the pin 14 end of the No-Slot Clock. DO NOT MIX UP PIN 1 WITH PIN 14. See figure 4 for a drawing of the No-Slot Clock pin 1 position.

NOTCH ——————→   ←—— **PIN 14**
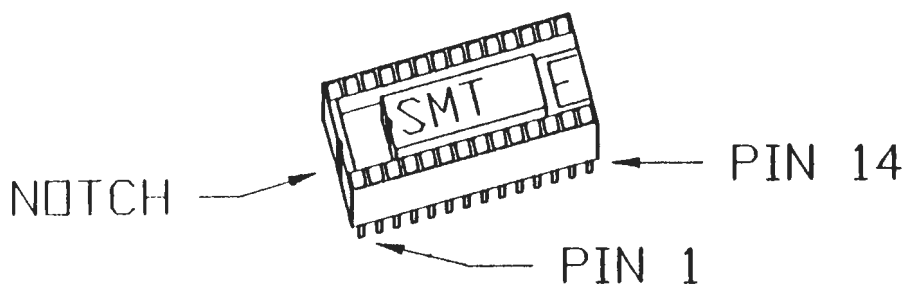
——————— **PIN 1**

Figure 4

7)   Carefully install the No-Slot Clock in the empty ROM socket on the motherboard of your computer. You must be certain pin 1 of the No-Slot Clock aligns with pin 1 of the ROM socket it is plugged into. Plugging the No-Slot Clock in backwards may damage the No-Slot Clock and/or your motherboard.

8)   Plug the ROM you removed from your motherboard in step 5 into the No-Slot Clock. Be careful not to bend any pins and that pin 1 of the ROM aligns with pin 1 of the No-Slot Clock.

9)   Reinstall the cover to your computer.

10)   Your installation is now complete. Refer to section 3 for instructions on using the No-Slot Clock utility software.

2.1.6 INSTALLATION ON DAUGHTERBOARDS.

The No-Slot Clock may be installed in a daughterboard of your computer if installation on the motherboard is inconvenient. A

"daughterboard" is a circuit board which is in-
stalled in one of the expansion slots of your
computer. Only daughterboards with a 28 pin
ROM socket are candidates for use by the No-
Slot Clock. This includes most Hard Disk Con-
trollers, Enhanced Graphics Adapters, and many
networking adapters.

1) Turn your computer off. Do not unplug
   the computer from the wall, since the 3
   prong plug helps ground the system.

2) Remove the cover from your computer.
   See your users manual for instructions on
   removing your cover if you don't know
   how.

3) Touch the metal power supply cover to
   discharge any static build up on you or
   your clothes.

4) Find and remove a daughterboard with a
   28 pin ROM socket. This may be a West-
   ern Digital^{tm} hard disk controller, a SMT
   Enhanced Graphics Adapter^{tm}, or any
   other board using a bios ROM. Call your
   dealer, or the SMT service line for help
   in locating an acceptable board. You will
   find a bracket holding the board to the
   rear panel. At the top of the bracket is
   a single screw which must be removed in
   order to remove the board from the com-
   puter. Pull the daughterboard upward with
   a gentle forward and backward rocking
   motion to disengage the gold contacts
   from the motherboard.

5) Locate the 28 Pin ROM socket. On a Western Digital^{tm} "WD-1002" hard disk controller the ROM has a sticker on it with the part number "62-0000 42-xxx", where xxx represents the version number. On an IBM or SMT Enhanced Graphics Adapter^{tm} the ROM is the only 28 pin device and is located just to the left of the gold edge connector.

6) You will need to remove the 28 pin ROM from its socket. Before removing the ROM make note of the pin 1 direction. If you don't know how to tell where pin 1 is, call the dealer where you bought the No-Slot Clock for assistance. Use an IC puller or a small flat-bladed screwdriver and carefully pry the ROM from the socket. BE VERY CAREFUL NOT TO DAMAGE THE ROM AS YOU PRY IT FROM ITS SOCKET.

7) Look at the No-Slot Clock. At one end of the No-Slot Clock you will notice an indentation. This is the pin 1 end of the No-Slot Clock. At the other end of the No-Slot Clock you will notice a big "E". This is the pin 14 end of the No-Slot Clock. DO NOT MIX UP PIN 1 WITH PIN 14. See figure 5 for a drawing of the No-Slot Clock pin 1 position.
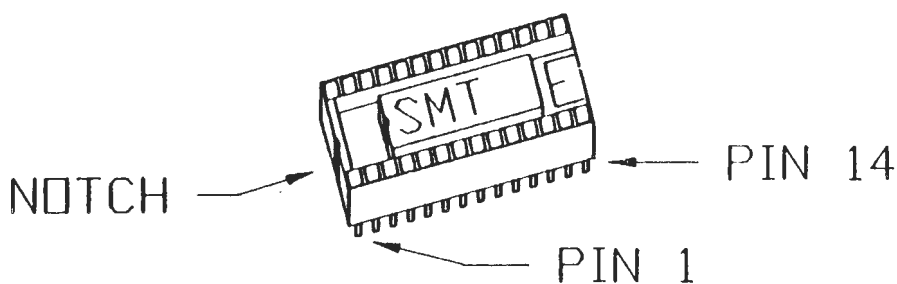
NOTCH   PIN 14

PIN 1

Figure 5

8)   Carefully install the No-Slot Clock in the empty ROM socket of the daughterboard you are working on. You must be certain pin 1 of the No-Slot Clock aligns with pin 1 of the ROM socket it is plugged into. Plugging the No-Slot Clock in backwards may damage the No-Slot Clock and/or your daughterboard.

9)   Plug the ROM you removed from your daughterboard in step 6, into the No-Slot Clock. Be careful not to bend any pins and that pin 1 of the ROM aligns with pin 1 of the No-Slot Clock.

10)   Reinstall the daughterboard into your computer by aligning the gold edge connector with the expansion slot of your motherboard. Rock the board forward and backward while gently pressing the card downward. Don't force the card. If you have trouble inserting the card check that the edge connector and the bracket are aligned with the motherboard and case correctly.

11) Your installation is now complete. Refer to section 3 for instructions on using the No-Slot Clock utility software.

2.2   APPLE IIe COMPATIBLE COMPUTERS

This section of the manual describes how to install the No-Slot Clock in an Apple IIe or compatible computer. If you are using an IBM compatible computer refer to section 2.1 above for installation instructions.

2.2.1   OVERVIEW

The No-Slot Clock may be installed in virtually any Apple IIe compatible computer. This includes the Franklin 2100 and the Laser 128. Installation consists of removing the ROM located on the motherboard of the computer containing the auxiliary ROM space, inserting the No-Slot Clock in the empty socket, and "piggy backing" the original ROM on the No-Slot Clock. The following instructions tell you how to find the correct ROM to use.

2.2.2   INSTALLATION - APPLE IIe

1. Turn your computer off. (Don't unplug it from the wall since the 3 prong plug helps ground the system.)

2. Remove the cover from your computer.

3. Touch the metal power supply case to discharge any static build up on you or

your clothes.

4. Look at the motherboard of your computer. You will find letters from A to F down the left side of the mother board. You will also find numbers from 1 to 14 along the front edge ·of the motherboard. Using the letters and numbers as X-Y coordinates you will find two 28 pin ROMs at location D-8 and D-10. Just above the chip at D-8 will be the label "CD ROM". The D-10 chip will be labeled "EF-ROM". We will install the No-Slot Clock under the "CD ROM". See figure 6.
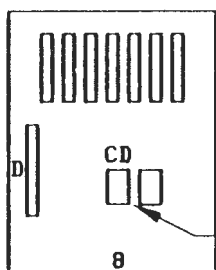
Apple IIe
Motherboard

Use this ROM.

Figure 6

5. Remove the "CD ROM" from its socket. Be very careful not to damage the ROM as you pry it out of its socket. Keep track of the pin 1 direction. If you don't understand this instruction contact your dealer for assistance. If you re-install this ROM backwards you may damage your computer. The SMT warranty does not cover this condition.

6. Look at the No-Slot Clock. At one end of

the clock you will notice an indentation. This is the pin 1 end of the clock. At the other end you will notice a big E. This is the pin 14 end. DO NOT MIX UP PIN 1 WITH PIN 14. See figure 7.

NOTCH — PIN 14

— PIN 1

Figure 7

7. Carefully install the No-Slot Clock in the empty ROM socket on the motherboard of your computer. You must be certain pin 1 of the clock aligns with pin 1 of the ROM socket it is plugged into. Plugging the clock in backwards will damage the clock.

8. Install the ROM (removed in step 5 above) into the No-Slot Clock. Be careful not to bend any pins, and that pin 1 of the ROM aligns to pin 1 of the clock. If you don't understand this instruction contact your dealer for assistance. If you re-install this ROM backwards you may damage your computer. The SMT warranty does not cover this condition.

9. Reinstall the cover to your computer.

10.   See section 3.2 for instructions on setting
       and using the No-Slot Clock.

2.2.3 INSTALLATION - APPLE IIc

       SMT highly recommends that you have the
No-Slot Clock installed by an authorized Apple
service center. Installation of the No-Slot Clock
in an Apple IIc involves opening the sealed case
and may void your computer's warranty. The fol-
lowing installation instructions are intended for
use by an Apple service center technician.

1.   Turn the computer off. (Don't unplug it
       from the wall since the 3 prong plug
       helps ground the system.)

2.   Remove the cover from the computer.

3.   Touch the metal power supply case to
       discharge any static build up on you or
       your clothes.

4.   Look at the motherboard of your com-
       puter. You will find one 28 pin ROM lo-
       cated near the front of the computer,
       directly under the keyboard.

5.   Remove this 28 pin ROM from its socket.
       Be very careful not to damage the ROM
       as you pry it out of its socket. Keep
       track of the pin 1 direction. If you re-
       install this ROM backwards you may
       damage your computer. The SMT warranty
       does not cover this condition.

6.   Look at the No-Slot Clock. At one end of

the clock you will notice an indentation.
This is the pin 1 end of the clock. At
the other end you will notice a big E.
This is the pin 14 end. DO NOT MIX UP
PIN 1 WITH PIN 14. See figure 8.
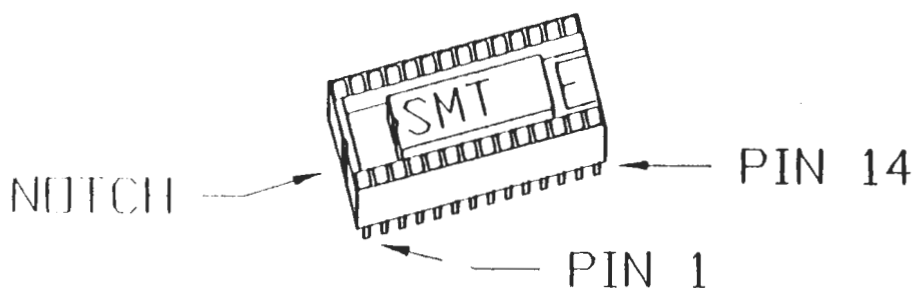

NOTCH — PIN 14

PIN 1

Figure 8

7.   Carefully install the No-Slot Clock in the
      empty ROM socket on the motherboard of
      your computer. You must be certain pin 1
      of the clock aligns with pin 1 of the
      ROM socket it is plugged into. Plugging
      the clock in backwards will damage the
      clock.

8.   Install the ROM (removed in step 5 above)
      into the No-Slot Clock. Be careful not to
      bend any pins, and that pin 1 of the
      ROM aligns to pin 1 of the clock. If you
      re-install this ROM backwards you may
      damage your computer. The SMT warranty
      does not cover this condition.

9.   Reinstall the cover to the computer.

10.   See section 3.2 for instructions on setting
      and using the No-Slot Clock.

2.2.4 INSTALLATION - Franklin ACE 2100

1. Turn the computer off. (Don't unplug it
    from the wall since the 3 prong plug
    helps ground the system.)

2. Remove the cover from the computer.

3. Touch the metal power supply case to
    discharge any static build up on you or
    your clothes.

4. Look at the motherboard of your com-
    puter. You will find three 28 pin ROMs in
    a row located near the left rear of the
    computer, opposite from the expansion
    slots. These ROMs are identified in white
    ink on the circuit board as U1, U2, and
    U3. The No-Slot Clock will be installed in
    the center ROM position (U2)

5. Remove the center 28 pin ROM (U2) from
    its socket. Be very careful not to damage
    the ROM as you pry it out of its socket.
    Keep track of the pin 1 direction. If you
    re-install this ROM backwards you may
    damage your computer. The SMT warranty
    does not cover this condition.

6. Look at the No-Slot Clock. At one end of
    the clock you will notice an indentation.
    This is the pin 1 end of the clock. At
    the other end you will notice a big E.
    This is the pin 14 end. DO NOT MIX UP
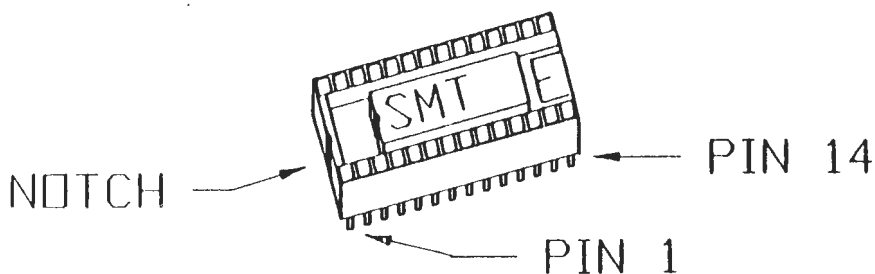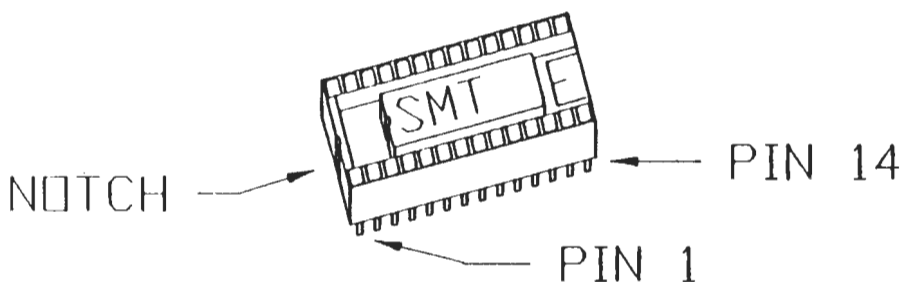   PIN 1 WITH PIN 14. See figure 9.

NOTCH ◄── ── PIN 14

PIN 1

Figure 9

7. Carefully install the No-Slot Clock in the
    empty ROM socket (U2) on the mother-
    board of your computer. You must be cer-
    tain pin 1 of the clock aligns with pin 1
    of the ROM socket it is plugged into.
    Plugging the clock in backwards will
    damage the clock.

8. Install the ROM (removed in step 5 above)
    into the No-Slot Clock. Be careful not to
    bend any pins, and that pin 1 of the
    ROM aligns to pin 1 of the clock. If you
    re-install this ROM backwards you may
    damage your computer. The SMT warranty
    does not cover this condition.

9. Reinstall the cover to the computer.

10. See section 3.2 for instructions on setting
    and using the No-Slot Clock.

2.2.5 INSTALLATION - LASER 128

1. Turn the computer off. (Don't unplug it
    from the wall since the 3 prong plug
    helps ground the system.)

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2.   Turn your computer upside down. You will
      find a small panel on the bottom side of
      your computer. Remove the panel from
      the computer.

3.   Look in the opening in your computer.
      You will find a 28 pin ROM located
      directly under the panel opening.

4.   Remove the 28 pin ROM from its socket.
      Be very careful not to damage the ROM
      as you pry it out of its socket. Keep
      track of the pin 1 direction. If you re-
      install this ROM backwards you may
      damage your computer. The SMT warranty
      does not cover this condition.

5.   Look at the No-Slot Clock. At one end of
      the clock you will notice an indentation.
      This is the pin 1 end of the clock. At
      the other end you will notice a big E.
      This is the pin 14 end. DO NOT MIX UP
      PIN 1 WITH PIN 14. See figure 10.

NOTCH ——————→   ←—— PIN 14

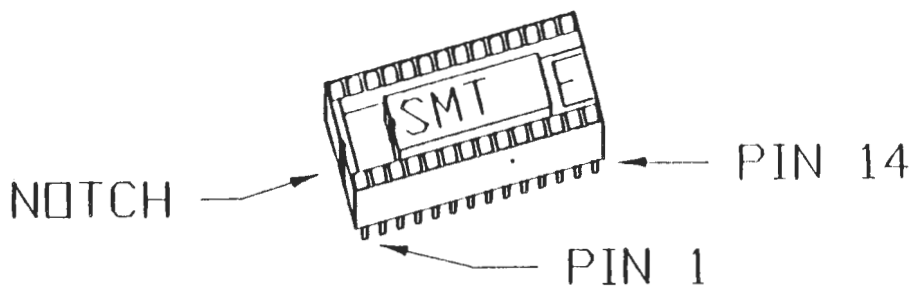   ←———— PIN 1

Figure 10

6.   Carefully install the No-Slot Clock in the
      empty ROM socket under the panel you

removed in step 2 above. You must be certain pin 1 of the clock aligns with pin 1 of the ROM socket it is plugged into. Plugging the clock in backwards will damage the cloc..

7.	Install the ROM (removed in step 4 above) into the No-Slot Clock. Be careful not to bend any pins, and that pin 1 of the ROM aligns to pin 1 of the clock. If you re-install this ROM backwards you may damage your computer. The SMT warranty does not cover this condition.

8.	Reinstall the cover to the computer.

9.	See section 3.2 for instructions on setting and using the No-Slot Clock.

SECTION 3.   SOFTWARE UTILITIES

Included with the No-Slot-Clock is a special dis-kette which will operate in both IBM and Apple compatible machines. This diskette contains IBM software utilities on the front side, with the label, and Apple utilities on the flip side without the label.

3.1   IBM COMPATIBLE COMPUTERS.

This section of the manual describes how to use the No-Slot Clock utilities in an IBM or MS DOS compatible computer. If you are using an Apple compatible computer, then skip to sec-tion 3.2 for software utility instructions.

3.1.1 OVERVIEW

The front side of the No-Slot Clock utility diskette contains two programs named XTCLOCK and CLKINIT. These programs read the time from the clock chip and initialize the time in the chip, respectively.

3.1.2 CLKINIT.COM

This program initializes the No-Slot Clock. It should be used when you first install your clock, and when you need to change the time. You must first tell your computer the correct Time and Date using the DOS commands "TIME" and "DATE". Then type "CLKINIT" at the DOS prompt. The program will clear the screen, find the clock, and display a message informing the user that the No-Slot Clock has been initialized to the system Date and Time. If no clock is installed or the clock is malfunctioning a "not found" message will be displayed.

3.1.3 XTCLOCK.COM

To use this program simply type "XTCLOCK" from the DOS prompt. The program will clear the screen, find the clock, and display a message informing the user that the system time has been set from the No-Slot Clock. If no clock is installed, or the clock is malfunctioning, a "not found" message will be displayed. Using this program is equivalent to answering the questions "DATE" and "TIME" at start up time. This program may be included in an AUTOEXEC.BAT file for automatic execution.

3.2   APPLE COMPATIBLE COMPUTERS

This section of the manual describes how to use the No-Slot Clock utilities in an Apple IIe compatible computer. If you are using an IBM compatible computer, then skip to section 3.1 above for software utility instructions.

The utility diskette supplied with the No-Slot Clock contains nine files. Four of these files are used by both ProDos and DOS 3.3. Two of these files are used to patch a ProDos based diskette to automatically support the clock. Two of these files contain ProDos and ProDos Basic. The last file is used to startup the utility menu under ProDos when this diskette is booted.

3.2.1 OVERVIEW

The back side of the No-Slot Clock utility diskette contains the utilities to operate the No-Slot Clock in both ProDos and DOS 3.3. These files are used to read and set the No-Slot Clock. The ProDos section also contains a program which will patch a ProDos diskette to automatically use the No-Slot Clock. This side of the disk can be copied in its entirety using the DOS 3.3 program "COPYA" or the ProDos volume copy command found in the "FILER". The DOS 3.3 "FID" program will copy only the DOS 3.3 files. The ProDos file copy commands, found in the "FILER" will copy only the ProDos files.

Please run the SETCLOCK utility from the utility menu at least once after you install your clock.

3.2.2 SETTING THE CLOCK

To use the No Slot Clock utilities insert the No-Slot Clock utility diskette into your disk drive with the label side down. Turn your computer on. The utility diskette will boot into ProDos and run the utility menu program named INSTALL.BAS. Use the arrow or number keys to highlight the "SETCLOCK" utility, then press the "RETURN" key to execute your selected operation.

The SETCLOCK option asks for the time, month, date, hours and minutes, please enter the information accordingly. Following this a message will be displayed stating that the time and date has been set. Press any key to return to the main menu.

3.2.3 PATCHING PRODOS

Select "INSTALL PATCH TO PRODOS SYSTEM" from the main menu . At this point the program will ask you to place a diskette to be updated into any drive (five inch or three inch diskettes both work!). If you are installing the patch onto your hard drive, simply press "RETURN" to proceed. You will then be asked for the "PREFIX" of the diskette or hard drive you wish to update. You may enter up to 63 characters. If you do not know the "PREFIX" you may enter the slot number, followed by a "RETURN", then the drive number. If you enter

an invalid "PREFIX", or incorrect slot and drive
number, the program will notify you of the er-
ror, then ask for the correct information. Next
will be a warning "UPDATE YOUR BACKUP
DISKS ONLY" followed by the question "ABORT
UPDATE OF PRODOS (Y/N)". Type "n" or "N"
to continue, any other .key will exit the
program. The program will proceed to update
your ProDos system. To use the No-Slot Clock
reboot your Apple system with the newly up-
dated diskette.

Every ProDos diskette you intend to boot
from (including APPLEWORKS) needs to be
patched. This includes the root directory of a
hard disk drive, if in use.

3.2.4 USING YOUR OWN PROGRAMS

If you do not intend to write your own
programs for the clock you do not need to read
this section of the manual.

There are two files on the diskette in-
tended to help you use the clock from your own
programs. These files work the same for both
ProDos and DOS 3.3. Both files are written in
machine code and may easily be used either
from BASIC or your own assembly language
program.

CLOCKREAD

This is a binary file containing 6502
machine code. This file is fully relocatable and
callable by either BASIC or other machine code
programs. To use from BASIC you need to

BLOAD the file CLOCKREAD at any location of your choice. Caution: If you BLOAD any file below 768 you probably will crash your program. After BLOADing the CLOCKREAD program you must CALL the program at the location you BLOADed it to. The CLOCKREAD program will read the clock and place in memory the current date and time. By peeking at eight addresses starting at the location you BLOADed + 3 you will find the year, month, date, day of week, hours, minutes, seconds, and hundreth of seconds. The BASIC program READCLOCK supplied on the disk uses this program, and may be used as an example. The most commonly used location to BLOAD this program to is 768 (300 hex).

CLOCKWRITE

This Is a binary file containing 6502 machine code. This file is fully relocatable and callable by either BASIC or other machine code programs. To use from BASIC you need to BLOAD the file CLOCKWRITE at any location of your choice. Caution: if you BLOAD any file below 768 you probably will crash your program. After BLOADing the CLOCKWRITE program you must POKE at eight addresses starting at the location you BLOADed + 3. You will set the year, month, date, day of week, hours, minutes, seconds, and hundreth of seconds. See figure 11 for valid ranges of each register. Then CALL the program at the location you BLOADed it to. The CLOCKWRITE program will read the time poked in memory and set the clock. You must set all 8 registers at a time. The BASIC program SETCLOCK supplied on the disk uses this program, and may be used as an example.

The most commonly used location to BLOAD this program to is 768 (300 hex).

VALID RANGE FOR CLOCKWRITE ROUTINE

REGISTER	OFFSET	MIN	MAX
YEAR	BASE + 3	00	99
MONTH	BASE + 4	01	12
DATE	BASE + 5	01	31 *1
DAY	BASE + 6	01	07 *2
HOURS	BASE + 7	00	23
MINUTES	BASE + 8	00	59
SECONDS	BASE + 9	00	59
1/100	BASE + 10	00	99

NOTES:
*1)   Maximum date varies with each month
*2)   Day of week --- 01 = Monday
                        07 = Sunday

Figure 11

SECTION 4. TECHNICAL INFORMATION

4.1   DESCRIPTION

The No-Slot Clock is a 28 pin, 600 mil wide DIP socket with a built in CMOS timekeeper function and an embedded lithium energy source to maintain time and date. It accepts any 28 pin bytewide ROM or volatile RAM. A key feature of the No-Slot Clock is that the timekeeper function remains transparent to the memory device placed above. The No-Slot Clock monitors VCC (+5 volts) for an "out of tolerance" condition. When such a condition occurs, an internal lithium energy source is automatically switched on to prevent loss of clock data.

Using the No-Slot Clock saves board space since the combination of No-Slot Clock and the mated memory device take up no more space than the memory alone. The No-Slot Clock uses pins 1, 8, 10, 11, 20 and 22 for timekeeper control. All pins pass through to the socket receptacle except for pin 20 (CE) which is inhibited during the transfer of time information.

The No-Slot Clock provides timekeeping information including hundredths of seconds, seconds, minutes, hours, days, date, month, and year information. The date at the end of the month is automatically adjusted for months with less than 31 days, including correction for leap years. The No-Slot Clock operates in either 24 hour or 12 hour format with an AM/PM indicator.

PIN CONNECTIONS

```
A14    1 □      □ 28   Vcc
       2 □      □ 27
       3 □      □ 26
       4 □      □ 25
       5 □      □ 24
       6 □      □ 23
       7 □      □ 22   OE
A2     8 □      □ 21
       9 □      □ 20   CE
A0    10 □      □ 19
DQ0   11 □      □ 18
      12 □      □ 17
      13 □      □ 16
GND   14 □      □ 15
```

PIN NAMES

Pin 1   A14 - Address Bit 14 (RESET)
Pin 8   A2   - Address Bit 2 (READ/WRITE)
Pin 10 A0   - Address Bit 0 (Data Input)
Pin 11 DQ0 - I/O$_0$ (Data Output)
Pin 14 GND - Ground
Pin 20 CE   - Conditioned Chip Enable
Pin 22 OE   - Output Enable
Pin 28 Vcc - +5 VDC to the Socket

All pins pass through to the Socket
except 20.

4.2 OPERATION

A highly structured sequence of 64 cycles is used to gain access to time information and temporarily disconnect the mated memory from the system bus. Information transfer into and out of the No-Slot Clock is achieved by using address bits A0 and A2, control signals OE and CE and data line DQ0. All No-Slot Clock data transfers are accomplished by executing read cycles to the mated memory address space. Write and read functions are determined by the level of address bit A2. When address bit A2 is low, a write cycle is enabled and data must be input on address bit A0. When address bit A2 is high, a read cycle is enabled and data is output on line DQ0. Both control signal (OE and CE) must be low to begin a memory cycle to the No-Slot Clock. Either control signal (OE or CE) must transition high to end a memory cycle directed to the No-Slot Clock. Communication with the No-Slot Clock is established by pattern recognition of a serial bit stream of 64 bits which must be matched by executing 64 consecutive write cycles, placing address bit A2 low with the proper data on address bit A0. The 64 write cycles are used only to gain access to the No-Slot Clock. Prior to executing the first of 64 write cycles, a read cycle should be executed by holding A2 high. Any read cycle will reset the comparison register pointer within the No-Slot Clock insuring the pattern recognition starts with the first bit of the sequence. When the first write cycle is executed, it is compared to bit 1 of the 64 bit comparison register. If a match is found, the pointer increments to the next location of the comparison register and awaits the

next write cycle. If a match is not found, the pointer does not advance and all subsequent write cycles are ignored. If a read cycle occurs at any time during the pattern recognition, then present sequence is aborted and the comparison register pointer is reset. Pattern recognition continues for a total of 64 write cycles as described above, until all the bits in the comparison register have been matched (this bit pattern is shown in Figure zzz). With a correct match for 64 bits, the No-Slot Clock is enabled and data transfer to or from the timekeeping registers may proceed. The next 64 cycles will cause the No-Slot Clock to either receive data on Data In (address A0) or transmit data on Data Out (DQ0), depending on the level of READ/WRITE (address A2). Cycles to other location outside the memory block can be interleaved with CE and OE cycles without interrupting the pattern recognition sequence or data transfer sequence to the No-Slot Clock.

An unconditional reset to the No-Slot Clock occurs by either bringing address A14 (RESET) low, if enabled, or on power up. This RESET can occur during pattern recognition or while accessing the No-Slot Clock registers. RESET causes access to abort and forces the comparison register pointer back to Bit 0 without changing the registers.

NONVOLATILE CONTROLLER OPERATION

The No-Slot Clock performs circuit functions required to make the timekeeping function nonvolatile. First, a switch is provided to direct power from the battery or VCC supply, depend-

ing on which voltage is greater. The second function provides power fail detection.Power fail detection occurs at typically 4.25 volts. Finally the nonvolatile controller protects the No-Slot Clock register contents by ignoring any inputs after power fail detection has occurred. Power fail detection also has the same effect on data transfer as the RESET input (address A14).

4.3   No-Slot Clock REGISTER INFORMATION

The No-Slot Clock information is contained in 8 registers of 8 bits each which are sequentially accessed one bit at a time after the 64 bit pattern recognition sequence has been completed. When updating the No-Slot Clock registers, each must be handled in groups of 8 bits. Writing and reading individual bits within a register could produce erroneous results. These read/write registers are defined in Figure zzz.

Data contained in the No-Slot Clock registers are in binary coded decimal format (BCD). Reading and writing the registers is always accomplished by stepping through all 8 registers, starting with bit 0 of register and ending with bit 7 of register 7.

AM-PM/12/24 MODE

Bit 7 of the hours register is defined as the 12 or 24 hour mode select bit. When high, the 12 hour mode is selected. In the 12 hour mode, bit 5 is the AM/PM bit with logic high being PM. In the 24 hour mode, bit 5 is the second 10 hour bit (20-23 hours).

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OSCILLATOR AND RESET BITS

Bits 4 and 5 of the day register are used to control the RESET and oscillator functions. Bit 4 controls the RESET (A14 - pin 1). When the RESET bit is set to logical 1, the RESET input pin is ignored. When the RESET bit is set to logical 0, a low on the RESET pin will cause the No-Slot Clock to abort data transfer without changing data in the watch registers. Bit 5 controls the oscillator. This bit is shipped from SMT set to logical 1, which turns the oscillator off. When set to logical 0, the oscillator turns on and the watch becomes operational.

ZERO BITS

Registers 1,2,3,4,5, and 6 contain one or more bits which will always read logical 0. When writing these location, either a logical 1 or 0 is acceptable.

COMPARISON REGISTER DEFINITION

	7	6	5	4	3	2	1	0
Byte 0	1	1	0	0	0	1	0	1
Byte 1	0	0	1	1	1	0	1	0
Byte 2	1	0	1	0	0	0	1	1
Byte 3	0	1	0	1	1	1	0	0
Byte 4	1	1	0	0	0	1	0	1
Byte 5	0	0	1	1	1	0	1	0
Byte 6	1	0	1	0	0	0	1	1
Byte 7	0	1	0	1	1	1	0	0

NOTE:
The pattern recognition sequence in Hex is:
C5, 3A, A3, 5C, C5, 3A, A3, 5C
The odds of this pattern occuring accidently
and causing inadvertent entry to the timekeeper
is less than 1 in 10^{19}

Figure 13

REGISTER DEFINITION CHART

	7	6	5	4	3	2	1	0
Register 0	0.1 Second				0.01 Second			
Register 1	0	10 Sec.			Seconds			
Register 2	0	10 Min.			Minutes			
Register 3	$\frac{12}{24}$	0	$\frac{10}{A/P}$	Hr.	Hour			
Register 4	0	0	Osc	Rst	0	Day		
Register 5	0	0	10 Date		Date			
Register 6	0	0	0	10 Mth.	Month			
Register 7	10 Year				Year			

Figure 14
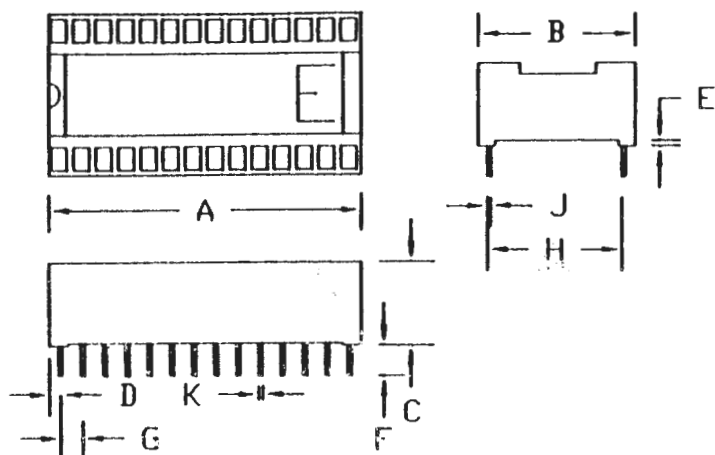
DIM.	INCHES.	
	MIN.	MAX.
A	1.390	1.420
B	.695	.710
C	.350	.370
D	.035	.065
E	.025	.035

DIM.	INCHES.	
	MIN.	MAX.
F	.120	.160
G	.090	.110
H	.590	.630
J	.008	.012
K	.015	.021

Figure 15

ADDENDUM

Date: 04/26/1987

Ref : No-Slot Clock version 2.1 in an Apple com-
    patible computer.

OVERVIEW

This addendum applies only to customers using the
No-Slot Clock in an Apple or Apple compatible
computer. If you are using an IBM compatible
computer you do not need to read this addendum.

The SMT No-Slot Clock code has been revised to
allow the use of the No-Slot Clock in several
locations of an Apple computer. The No-Slot
Clock can now be installed in some Apple II or
II+ computers, if the computer has a compatible
card installed slots 1 through 7.

INSTALLATION

This section describes the installation of the No-
Slot Clock into an expansion card for use on an
Apple II or II+ computer. Please refer to section
2.2 of the No-Slot Clock users manual for in-
structions on installing the No-Slot Clock in the
motherboard of an Apple IIe, IIc, Franklin Ace
2100, or Laser 128.

The No-Slot Clock will work in some expansion
cards plugged into slots 1 through 7. For an ex-
pansion card to be compatible with the No-Slot
Clock it must have a 28-PIN ROM socket
addressed at the 2K byte ROM expansion area
(Hex C800-CFFF). This includes the SMT ENVOY
card, the SMT MEMORY EXPANDER card, and
many cards by other manufacturers.

ADDENDUM

Refer to the following instructions to install the No-Slot Clock into an expansion card:

1) Turn off your computer. Do not unplug your computer from the wall, since the three prong plug helps ground the system and protects it from static electricity.

2) Remove the cover from your computer.

3) Touch the metal power supply cover to discharge any static electricity which may be on your person or your clothes.

4) Remove the card from the computer that you intend to install the No-Slot Clock into.

5) Locate the 28-Pin ROM socket on the board. If you don't know how to do this ask your dealer for help. (On the ENVOY card this is U2, see figure 1).

6) Note the position of pin 1 of the ROM installed in the socket. If there is a 24-pin ROM installed in a 28-pin socket be sure to note which pins of the socket are not used. See figure 1 for an example using the ENVOY card by SMT.

7) Carefully remove the ROM from the socket located in step 5 above. Be sure not to damage the ROM as you pry it out of its socket. Keep track of the pin 1 direction. If you re-install this ROM backwards you may damage your computer. The SMT warranty does not cover this condition.

ADDENDUM

28 PIN ROM SOCKET
WITH 24 PIN ROM
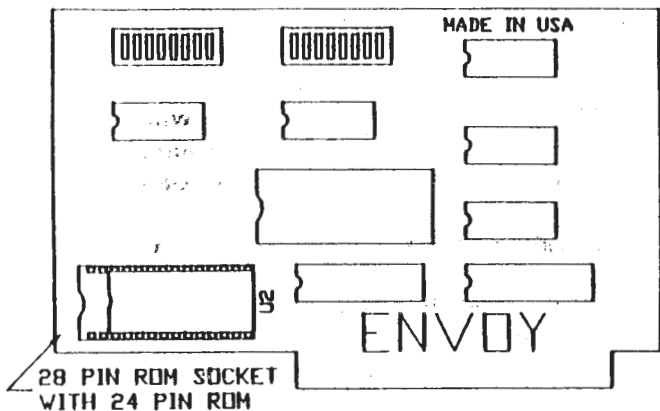
8) Look at the No-Slot Clock: At one end of
the clock you will notice an indentation.
This is the pin 1 end of the clock. At the
other end you will notice a big "E". This is
the pin 14 end. DO NOT MIX UP PIN 1
WITH PIN 14.

9) Carefully install the No-Slot Clock In the
empty ROM socket. You must be certain
pin 1 of the clock aligns with pin 1 of the
ROM socket it is plugged into. Plugging the
clock in backwards may damage the clock.

10) Install the ROM (removed in step 7 above)
into the No-Slot Clock. Be very careful not
to bend any pins and that pin 1 of the
ROM is in the same position it was
originally in before you removed it. If you
install this ROM in wrong you may damage
your computer.

11) Reinstall the card into the slot you
removed it from in step 4 above.

ADDENDUM

12)   Reinstall the cover to your computer.

SOFTWARE UTILITIES

Make a working copy of the backside of the No-Slot Clock utilities diskette. Keep the original disk in a safe place. Do not use the original disk for anything except for making a working copy.

The utilities diskette must be configured to tell the software where you have installed the No-Slot Clock before using the No-Slot Clock. After configuring the utilities diskette, each of the routines operate as described in the No-Slot Clock users manual.

The first time you boot the utilities disk it will load ProDos 1.2 and automatically go to the configuration menu. If you have already installed the No-Slot Clock into your computer, select the AUTO-FIND option. The software will locate the Clock, and patch the ProDos section of the utility diskette. If you have not installed the clock into your computer you may still run the configuration routine by specifying where the clock will be located. This configuration patches the binary files CLOCKREAD, CLOCKWRITE, and PATCH.

Before using the DOS 3.3 routines you must run the program "CONFIGURE". This program works exactly the same as the ProDos program except it patches the CLOCKREAD and CLOCKWRITE binary files.

MODIFYING THE NO SLOT CLOCK
TO WORK WITH A 24 PIN EPROM SOCKET
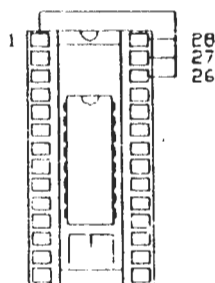
JUMPER PINS 1, 26, 27, & 28
TOGETHER WITH THIN WIRE.

PRESS THE NO SLOT CLOCK INTO
THE 24 PIN SOCKET WITH PINS
1, 2, 27, & 28 HANGING BEYOND
PIN ONE OF THE SOCKET.
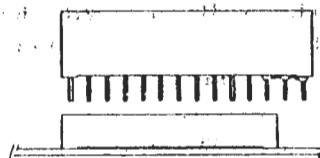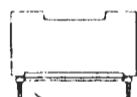
SOLDER THE WIRE JUMPER NEAR
THE BASE OF THE NO SLOT CLOCK
SO THE CLOCK CAN STILL BE
INSTALLED IN THE 24 PIN SOCKET.

WHERE TO INSTALL THE NO-SLOT-CLOCK

WE DON'T KNOW WHERE TO PUT THE NO-SLOT-CLOCK IN EVERY TYPE OF
COMPUTER, BUT WE KNOW WHERE TO PUT IT IN A FEW.

UNDER THE LOW BIOS EPROM IN IBM CLONE WITH HI AND LOW BIOS.
IN THE U17 SOCKET IN IBM PS/2 MODEL 25.
IN THE U19 SOCKET IN IBM PC/XT.
IN THE EPROM SOCKET CLOSEST TO THE POWER SUPPLY IN IBM PC.
IN THE U41 SOCKET IN TANDY 1000 OR 1000SX.
UNDER THE U43 SOCKET IN FRANKLIN PC6000/8000.

IN A COMPAQ PORTABLE, UNDER THE 28 PIN ROM SOCKET LOCATED
JUST LEFT OF THE DRAM WHEN VIEWED FROM THE REAR.

UNDER THE CD ROM IN OLD APPLE //E
UNDER THE CF ROM (THE ONLY PROGRAM ROM) IN NEW APPLE //E
UNDER THE 28 PIN ROM LOCATED UNDER THE KEYBOARD IN APPLE //C
IN THE U2 SOCKET IN FRANKLIN ACE 2100
UNDER THE ROM ACCESSIBLE THROUGH THE BOTTOM PANEL IN LASER 128

YOU MAY STILL NOT BE SURE WHERE THE CLOCK GOES IN YOUR COMPUTER.
IN THIS CASE, EXPERIMENT. INSTALL THE CLOCK UNDER 28-PIN ROMS UNTIL
YOU FIND ONE THAT WORKS. YOU WILL NOT DAMAGE YOUR COMPUTER IF
THE NO-SLOT-CLOCK IS INSTALLED IN THE WRONG SOCKET, AS LONG AS
YOU DON'T BREAK PINS OR INSTALL THE CLOCK OR AN IC IN BACKWARDS.
IF YOU LOOK DOWN ON AN IC FROM ABOVE WITH THE LITTLE NOTCH
ORIENTED UP, PIN 1 IS ALWAYS AT THE UPPER LEFT. MOST SOCKETS ALSO
HAVE A LITTLE NOTCH TO GUIDE YOU IN INSTALLING THE NO-SLOT-CLOCK
AND ROM CORRECTLY.

MODIFYING THE AUTOEXEC.BAT FILE

IN IBM PC AND COMPATIBLE COMPUTERS, SOME SPECIAL NO-SLOT-CLOCK
COMMANDS MUST EXIST IN THE AUTOEXEC.BAT FILE IN THE ROOT
DIRECTORY OF YOUR BOOT DRIVE. THE FOLLOWING KEYSTROKES (ENTERED
AT THE '>' DOS PROMPT) WILL CREATE THE NEEDED AUTOEXEC.BAT FILE.

```
COPY CON AUTOEXEC.BAT
ECHO OFF
CLS
PATH = C:
PROMPT = $P$G
XTCLOCK.COM
MODE CO80        (C OH EIGHT ZERO)
F6               (OR CTRL-Z)
```

PRESS ENTER AFTER EACH LINE. AFTER YOU ENTER F6, DOS PRINTS THE
MESSAGE '1 FILE COPIED'. AFTERWARDS ENTER 'TYPE AUTOEXEC.BAT' TO
SEE THE FILE AND VERIFY CORRECT ENTRY.

IF YOU ALREADY HAVE AN AUTOEXEC.BAT FILE, DON'T TYPE THE 'COPY
CON AUTOEXEC.BAT' LINE LISTED ABOVE BECAUSE IT WILL DESTROY YOUR
OLD FILE. INSTEAD, TYPE THE FOLLOWING COPY COMMAND, FOLLOWED BY
THE SAME DOS COMMANDS. THE COMMANDS WILL BE ADDED TO THE END OF
THE EXISTING AUTOEXEC.BAT FILE.

```
COPY AUTOEXEC.BAT+CON
ECHO OFF
CLS
PATH = C:
PROMPT = $P$G
XTCLOCK.COM
MODE CO80        (C OH EIGHT ZERO)
F6               (OR CTRL-Z)
```